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FOREST PEST LEAFLET 133

Anthracnose of Eastern Hardwoods

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Anthracnose diseases of hardwood tree species are widespread throughout the eastern United States. These diseases are caused by several species of closely related fungi that produce browning and blackening of parts of leaves followed, under certain conditions by defoliation and damage to stems, buds, and fruits. Symptoms vary somewhat depending on the species of tree attacked. Repeated loss of foliage reduces growth, weakens the tree, and increases its susceptibility to borer attack and winter injury.

Tree Species Affected

Species of eastern hardwoods attacked by anthracnose fungi include sycamore, oak, walnut, maple, ash, hickory, elm, birch, catalpa, basswood, planetree, tuliptree, and horsechestnut (table 1). The disease has been found wherever these trees are growing. It is particularly severe on American sycamore, black walnut, white oak, and others in the white oak group. During some seasons, these species are almost completely defoliated. Infection has frequently been

found on other oak species, including scarlet, black, red, and southern red oak. Pin oak, swamp chestnut, bur oak, and London planetree are occasionally infected by the fungus. On black walnut, defoliation by the anthracnose fungus affects nut production. On horsechestnut, the disease is called "leaf blotch"; and on some species, for instance elm, hickory, and walnut, it is sometimes called "leaf spot."

Symptoms and Signs

Depending on the tree species involved, symptoms on infected leaves vary from tiny black, brown, or purple spots to large, circular, or irregular dead blotches. Spots may merge until the whole leaf is affected. When trees are attacked early in the spring, the newly emerging leaves are often killed and turn black as if frost damaged. If not killed, the young and still growing leaves may become distorted by unequal growth of healthy and infected parts. This is common on oak. On sycamore and maple, infected areas are often found along the leaf veins and midrib (fig. 1). Defoliation occurs when infection is severe, but a second crop of leaves is usually produced if defoliation occurs in spring or early summer.

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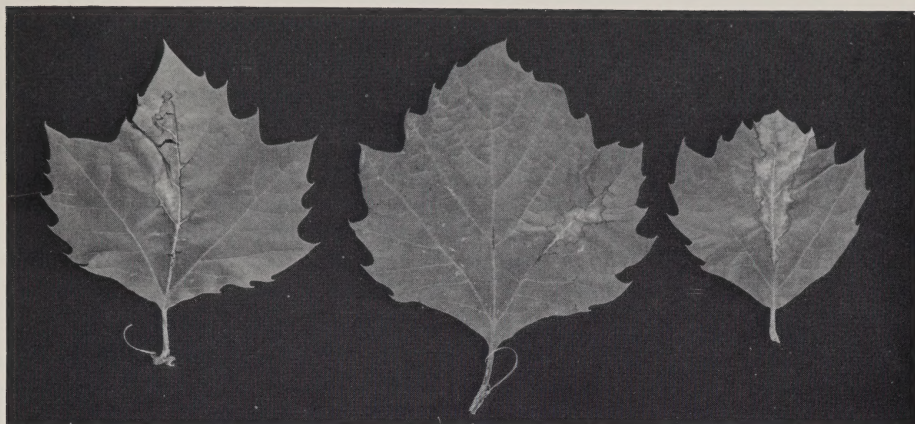
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TABLE 1.—*Trees affected by anthracnose diseases*

Common name	Botanical name	Anthracnose pathogen	Parts of trees attacked
Ash, several species	<i>Fraxinus</i> sp.	<i>Gloeosporium aridum</i>	Leaves.
Basswood	<i>Tilia americana</i>	<i>Gnomonia tiliae</i>	Leaves, twigs.
Birch, several species	<i>Betula</i> sp.	<i>Gloeosporium betulae-luteae</i> <i>G. betularum</i> .	Leaves.
Catalpa, northern and southern	<i>Catalpa speciosa</i> and <i>C. bignonioides</i>	<i>Gloeosporium catalpae</i>	Leaves.
Elm, several species	<i>Ulmus</i> sp.	<i>Gloeosporium inconspicuum</i>	Leaves, twigs.
Hickory, several species	<i>Carya</i> sp.	<i>Gnomonia caryae</i>	Leaves, twigs.
Horsechestnut	<i>Aesculus hippocastanum</i>	<i>Glomerella cingulata</i>	Leaves, twigs.
Maple, several species	<i>Acer</i> sp.	<i>Gloeosporium apocryptum</i>	Leaves, twigs.
Oak, many species	<i>Quercus</i> sp.	<i>Gnomonia quercina</i>	Leaves, twigs, buds, shoots.
Planetree, London	<i>Platanus acerifolia</i>	<i>Gnomonia platani</i>	Leaves, twigs, buds, shoots.
Sycamore, American and European	<i>Platanus occidentalis</i> and <i>P. orientalis</i>	<i>Gnomonia platani</i>	Leaves, twigs, buds, shoots.
Tuliptree or yellow-poplar	<i>Liriodendron tulipifera</i>	<i>Gloeosporium liriodendri</i>	Leaves.
Walnut, several species	<i>Juglans</i> sp.	<i>Gnomonia leptostyla</i>	Leaves, twigs, nuts.



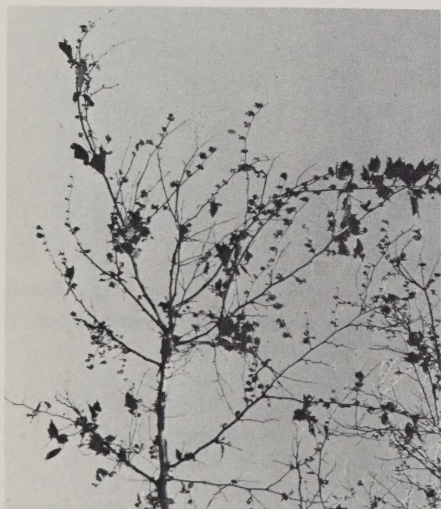
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Figure 1.—Sycamore anthracnose leaf blight showing typical dead blotches concentrated around veins and midrib.

Symptoms on most trees are confined to the leaves. However on some trees—including sycamores and white oaks—the twigs, buds, and shoots may be attacked and disfigured.

On sycamore, there are four distinct stages of anthracnose—twig, bud, shoot, and leaf blight. These stages often overlap. *Twig*

blight occurs in the spring before the leaves emerge, killing the tips of small 1-year-old twigs (fig. 2). Small ($\frac{1}{200}$ -inch diameter), black fruiting bodies of the fungus soon break through the bark of the killed twigs. Later, cankers may appear on older wood (branches) below the dead twigs. These affected branches may be girdled and killed.



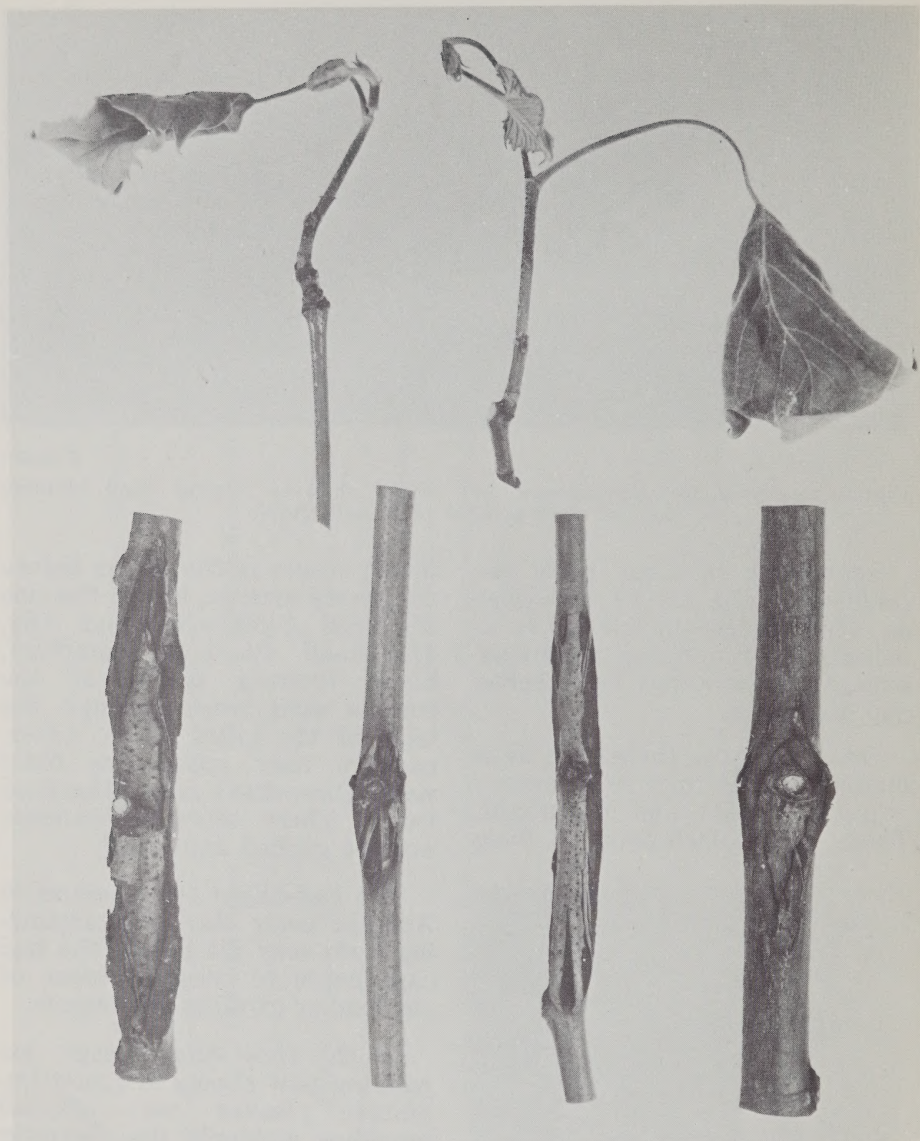
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Figure 2.—Severe twig blight of sycamore for several successive years results in gnarled or brushy branch growth.

The *bud-blight* stage occurs in April or early May. The expanding buds may die before the bud caps begin to break, because of the canker girdling the branch.

In the *shoot-blight* stage, expanding new shoots and new immature leaves on affected branches suddenly die. Severity of the shoot blight stage is determined by the temperature during the 2-week period immediately after emergence of the first sycamore leaves in the spring. This stage is most severe when the average mean daily temperature during this period is 50° to 55° F. Above 60° F., there is little or no shoot blight.

In the fourth and final stage, leaf blight, expanding or mature leaves are infected from fungus



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Figure 3.—The sycamore anthracnose fungus frequently forms cankers on the branches around the bases of the diseased twigs.

spores produced on twigs and branch cankers (fig. 3). Dark-brown fruiting bodies of the fungus are found on diseased leaf tissue.

Cause

The fungi that cause anthracnose overwinter in infected leaves

and twigs on the ground or in cankered twigs still on the tree. In the spring, during rainy periods, large numbers of microscopic spores are discharged from these overwintered leaves or twigs. These spores are wind-blown or splashed by rain onto the young developing leaves on

host trees. When the spores lodge on leaves of a susceptible tree species, they germinate under moist conditions, and the fungus penetrates the leaves.

On some species—for instance, ash and walnut — secondary spores, called “summer spores,” are produced in fungus fruiting bodies on infected parts of the new leaves. Borne in large numbers, they are spread from leaf to leaf by wind and splashing rain. The rapid increase and spread of anthracnose in the summer and fall occurs by means of these summer spores.

The disease may be severe in a year when long, cool, rainy periods occur; and the following year, if weather conditions are unfavorable, it may be inconspicuous or absent.

Control

There is no practical control of anthracnose for trees growing under forest conditions. Spraying and pruning are far too expensive. Forest-management practices, such as thinnings, that allow better air movement and more sunshine may inhibit disease development by facilitating rapid drying of foliage after rains. Proper air outflow should be considered in the selection of sites for forest plantations.

For shade and ornamental trees and nursery stock, one means of control is elimination of the overwintering fungus in plant materials. Raking leaves and pruning out infected twigs and branches reduces the amount of inoculum that causes primary infection in the spring. This infected material should be destroyed by burning or by other appropriate means. Application of a complete fertilizer such as 10-6-4 will usually improve the

vigor of trees weakened by repeated attacks of anthracnose.

The use of anthracnose-resistant species or varieties should be considered. As previously mentioned, London planetree is much less susceptible than American sycamore; and oaks in the red oak group are relatively resistant compared with white oaks.

Anthracnose can be controlled by proper application of chemicals in the spring. Bordeaux (4-4-50) is registered for use against anthracnose on elm, maple, and sycamore. In addition, Dodine can be used for sycamore and walnut anthracnose. Specific recommendations on use of these chemicals vary with the type of anthracnose disease and with locality so are beyond the scope of this leaflet. An extension pathologist or forester should be consulted about proper spray programs.

Caution: Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers—out of reach of children and pets—and away from food-stuff.

Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. Avoid prolonged inhalation of a pesticide spray or dust. Be fully clothed when applying a pesticide.

After handling a pesticide, do not eat, drink, or smoke until you have washed. In case a pesticide is swallowed or gets in your eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If the pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Dispose of empty pesticide containers by wrapping them in several layers of newspaper and placing them in your trash can.

It is difficult to remove all traces of a herbicide (weed killer) from equipment. Therefore, to prevent injury to desirable plants, do **not** use the same equipment for insecticides and fungicides that you use for a herbicide.

Note: Registrations of pesticides are under constant review by the U.S. Department of Agriculture. Use only pesticides that

bear a USDA or EPA registration number and carry directions for home and garden use.

References

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